layer of the retina; both the latter phenomena were discovered by Boll. But Professor Engelmann, of Utrecht, adds another to the objective disturbances caused by light in the retina, namely, that of movement of the inner segment of the retinal cones. The inner segments of the cones become shorter under the influence of light and longer when the light is removed. The amount of this difference in length owing to illumination varies in different animals. The difference was most marked in the fish and frog. In a fish which was kept eight hours in the dark the inner cone segments, measuring from the *mem. lim. ext.* to the inner pole of the cone ellipsoid, had a length of about 50μ; after remaining several hours in diffuse daylight the length of the inner cone segments in the same animal was only about 5μ. In preparing the retina for observation the eye-ball was rapidly excised and plunged in 3.5 per cent nitric acid, or for several minutes was warmed to 70°–80° C. in 0.5 per cent salt solution.

A frog which has been kept in the dark shows maximal contraction of the cones after several minutes exposure to diffuse daylight. All parts of the visible spectrum produce the change in question, but the more refrangible rays have apparently most marked influence. It is apparently the inner cone segment itself which is directly affected by the stimulus. The movement of the cones and of the epithelial pigment seems to be under the control of the nervous system; for if an animal which has been kept long enough in the dark to bring about maximal lengthening of the cones and retreat of the pigment, be exposed to light so that only one eye is illuminated, the influence of the light is manifested by both retinas; but if the brain has been previously destroyed, the contraction of the cones and the moving inward of the pigment occur only in the eye which is directly exposed to light. We may, therefore, consider that the movements in question are reflex actions, and that the optic nerves contain *motor* fibers for the protoplasm of the cones and of the retinal epithelium. Engelmann declares also that light acting directly upon the skin of a frog whose head is kept in the dark, brings about the same retinal changes as does light falling directly upon the eyes.—*Pflüger's Archiv., Bd. 35, s. 498.*

PSYCHOLOGY.

Applied Metaphysics of Sex.—When ethics is reduced to a science it is a department of metaphysics. Its application to practice will be "morals." One of its data is the law of Confucius, that man should not do to another what he would not wish that another should do to himself. The converse of this proposition, as uttered by Christ, imposes a greater proportion of active measures. Both are relatively carried into practice to the degree in which the wishes of men are subordinated to their intelligence.

They embody the regulating principle for what are called the purely selfish or appetent qualities of the mind.

For the sympathetic qualities, whose selfishness is diffusive, and includes good will to one or more other persons, somewhat different data are necessary. The leading interest in this department is that of sex. The metaphysical condition of love, is a pleasurable hyperæsthesia connected with the mental or actual image of a person of the other sex. The province of ethics, and its application in law in this matter, is the security of the persons interested in this property, mental and physical. If this hyperæsthetic state were always prominent, because based on sufficient grounds, there would be no necessity for laws in the matter, any more than there is necessity for laws to compel people to retain a fortune or a sound stomach. But in fact this hyperæsthesia sometimes has no sufficient *raison d'être* in the character of its object. Sometimes the mental powers are unable to retain it long at a time; and some persons have little or no capacity for its metaphysical form. For the protection of people who are highly developed in this respect, laws have been enacted which punish infringements on their rights of property.

It is, however, evident that these laws may and do work to the injury of the people they are designed to protect. This is the case, *e. g.*, when persons of great affectional capacity are bound to those of little or no capacity. It is the case where a person of fine general organization is bound to a person of coarse and brutal organization. It is also true where persons of high development of sex affection are otherwise of totally diverse and antagonistic constitutions. Hence divorce laws for the separation of such ill-mated persons have been enacted, and their utility cannot be denied.

It is not divorce laws which are to be feared, but something which lies deeper; that is the weakening of the metaphysical sex interest, and its subordination to lower or less important interests. Any system of religion, state policy, or social custom, which tends to weaken the force and freedom of conjugal affection, is probably the greatest curse that can befall a country. A principal reason why this is true is because the metaphysical sex interest constitutes one of the most important stimuli to exertion, and therefore to development.

One of the causes which destroy this primal source of energy and happiness in life, is the prevalence of the idea that the sentiment of love has no real existence; that it is a deception, or at best a sensation of short duration. Such a view can only be demonstrated in the lives of people in whom the instinct and sentiment are weak or wanting. For such it is doubtless true; but the blind man cannot prove that all men are like himself; he is debarred by natural incapacity. But well-constituted persons frequently adopt the idea on various grounds. The reason why

such well-constituted persons may entertain such a view, is the failure of the individual to realize his or her ideal in this direction.

One principal cause of failure to realize the ideal conjugal state, is constitutional weakness of the sentiment. This may be mental alone, or it may be physical. If the "grand passion" is to exist, its physical basis must not be destroyed. When the affection is properly developed, it leads to a subordination of many things which would conflict with it. Truth and honor become the basis of permanent confidence between the contracting parties, and everything that is disagreeable to the object of affection will be abandoned, so far as consistent with the necessities of existence, and of honorable conduct to others. When the sex sentiment is not well developed, these ameliorations will not take place. One or both persons will have ground of complaint, and if in the balance of motives either finds it more pleasant to him or herself to be disagreeable to their matrimonial partner than to be agreeable, the term of such persons' association is likely to come to a speedy end. In the case of personal bearing the male sex is often the sinner, since the more sensitive nature of the woman requires more consideration than the more indifferent constitution of the man. In the matter of rationality of conduct and opinions, the female more frequently errs.

One of the causes which tend to weaken the sex sentiment, is want of intellectual sympathy. This is at present a more or less necessary evil, but the development of the intellect is progressing, and will bear rich fruit in the field of the affections. Perhaps the most important factor in this progress, is the education of women. Their general want of interest in and knowledge of the thoughts and interests of man, is a fruitful source of the indifference with which devotion is too often rewarded; and it is impossible that it should be otherwise. Women of feminine type, with developed intelligence, have never failed of response from the other sex.

The metaphysical history of love is one of development, like that of any other mental faculty. Women display a greater capacity in this respect than men, for while many of them are as incapable in love as in reason, they much oftener rise to a high development of affectional activity and power than does the otherwise stronger sex. As to the application to practical life, the principle to be kept in view is this: the highly developed must be protected from the badly developed, both in and out of matrimony. As development of the mind in any faculty is a slow process, for a long time law will have to divide its sanctions, so as to encourage fidelity on the one hand, and on the other to facilitate the separation of incongruous partners. And that is what it is now doing in some countries with generally good results. Where divorce laws are properly framed and executed, if any social evils exist, they are due to defects in people them-

selves, and cannot be overcome by enactment. But in many countries the laws are such as to encourage and increase social evils, if not to produce them.

It is satisfactory to know that nature is necessarily more conservative in this field than in any other, so that pessimism has little ground for assurance. The incapable and the feeble in love have little part in the increase of the race. The irregular, excessive, or abnormal development of the passions have still less chance of propagation. The only cause for regret is the apparent inability of the best intellect to reproduce itself in any abundance. The future of applied science may bring us the remedy for this also.—*E. D. Cope.*

TENACITY AND FEROCITY IN THE RACCOON.—Happening lately to pass around the shores of a neighboring pond in my rambles, I noticed a crowd of boys gazing excitedly at one of their companions who had mounted a large tree overhanging the water, and was "shinning" his way toward the top of it. Inquiry revealed the cause to be a half-grown raccoon, which had taken up its quarters there for the day, seeming much disposed to stay where it was, despite the efforts of the youth to dislodge it; and he, having exhausted every method of persuasion suggested by his fellows, reluctantly descended to the ground, and a bombardment of stones then began which, though often well directed, did not budge young Procyon one inch from his comfortable position.

One of the spectators then produced a revolver and two rounds were fired by the "best shots" in the crowd, six bullets of the fourteen taking effect in its body. Terrible as these wounds were afterward found to be, the animal "held the fort" (so to speak) with dogged tenacity, its only efforts being confined to clinging to its chosen position in a fork of the tree. Seeing this, one of the boys started off and in a few minutes returned armed with a rifle. The second shot from this struck one of its fore-feet, passing directly through the ball of it. This wound, trivial when compared with the others, so maddened the poor beast that it tried hard to change its position, but its hindquarters being paralyzed it was unable to accomplish that feat, so in sheer desperation it began to rend the useless member with its teeth, savagely tearing it to pieces and dropping them to the ground. Another sure-flying bullet now sped on its merciful errand, and, struggling fiercely with death, the raccoon relaxed its grasp till one paralyzed foot alone sufficed to support its swinging body beyond the eager reach of its tormentors. And there it hung on, till in its dying efforts to regain the former position, it fell fifty feet to the ground with enough life remaining to justify considerable commotion among the boys while administering the *coup-de-grace.*

This instance brings to mind another which happened during the winter of 1879–80. Whilst a scholar at Westtown, Chester

county, Pa., I found, during one of my excursions along Chester creek, a half-grown "coon," which had snugly tucked itself up in the forks of a dead willow that stood on the opposite bank of the stream from me. It had its back to me, and desirous not to spoil the valuable pelt, I drew off some twenty yards and sent a heavy charge of shot into its body;—such at least was my intent, but, judging of results, I did not accomplish it. Beyond a violent tw tching of the skin as if to rid itself of a fly or other insect pest, there was no counter demonstration on the coon's part. My next fusilade was tendered from the creek bank, the long barrel of my weapon reaching within fifteen feet of the animal. At touch of trigger the results were tremendous, and after taking sufficient time to recover lost ground and senses, I realized that the concussion had worked both ways, and the coon, thoroughly aroused from its day-dream, was now floundering about, growling and gurgling in the depths of the creek. Having spent nearly a minute in that manner, it rose to the surface and divided its efforts there between reaching the bank and tearing the wounds in its body with teeth and claws, evincing a most desperate fury in every action. After continuing this long enough to have drowned the liveliest of cats, it reached the opposite shore, and instead of climbing upon it, the maddened creature disappeared *beneath* it, where a strong eddy of the waters washed and swirled under the overhanging banks and tree-roots. This suicidal manœuvre seemed so deliberate and intentional that hope of securing my game was well nigh gone from me ere it again emerged growling and gnashing its teeth as if enraged that it had not found death by other hands than mine.

Becoming fully sated with such an exhibition of brute ferocity and self-inflicted sufferings, I crossed the creek and succeeded, after a ten minutes' skirmish, in reducing it to perfect harmlessness without other disaster than several desperate nips on the toes of my boots, one of which was received after I had supposed the animal was dead.

I refrain from entering into detail of this closing scene further than to remark that it so impressed me with the fiendish vitality of a wounded raccoon, that hereafter similar encounters will be carefully avoided.—*S. N. Rhoads, Haddonfield, N. J.*

Likes and Dislikes of a Deer.—Mr. Simmons, who owns the yearling deer which I have mentioned in my article on Macrotis, informs me that he allows the barnyard fowls to share the grain fed to him without the least manifestation of hostility or displeasure, except as to a cock belonging to a neighbor. Whenever this bird flies into the paddock to pay a neighborly visit, the deer "goes for" him at once and puts him out with manifestations of anger or repugnance.—*J. D. Caton.*